

REMARKS

Reconsideration and allowance of this application are respectfully requested in light of the foregoing amendments and the following remarks.

STATUS OF THE CLAIMS

Claims 1-22 are pending.

Claim 18 is rejected under 35 U.S.C. 112 as being indefinite.

Claims 1-22 are rejected under 35 U.S.C. 103(a) as being obvious over the U.S. Patent No. 6,359,022.

In the alternative, Claims 1-22 are rejected under 35 U.S.C. 103(a) as being obvious over the U.S. Patent No. 6,359,022 in view of the U.S. Patent No. 3,842,036.

Claims 1, 8, 11-14, 16, 18-19, and 21-22 have been amended, and Claims 6-7 are cancelled.

Support for amending Claims 1, 8, 11-14, 16, and 18-19 is found in the International Publication No. WO 2004/063423, Page 4, Line 20 to Page 5, Line 1.

THE INVENTION

The instant inventions, as described in Claim 1, discloses polyol composition suitable for the preparation of a rigid polyisocyanate-based foam including: (a) a blowing agent; and (b) an aromatic polyol. The blowing agent includes formic acid, and formic acid comprises 0.5 to 8 parts per 100 parts by weight of the polyol composition including said formic acid. The aromatic polyol includes an aromatic polyoxyalkylene polyol based on an initiator

obtained from the condensation of a phenol with an aldehyde, and the aromatic polyoxyalkylene polyol comprises at least 20 weight percent based on total weight of the polyol composition.

PRIOR ART REFERENCES

U.S. Patent No. 6,359,022 ("Hickey") discloses a resin blend including: (a) an aromatic polyester polyol reaction product formed by inter-esterification of a phthalic acid based material; a hydroxylated material having a functionality of at least 2; and a hydrophobic material; and (b) a C₄-C₈ hydrocarbon blowing agent. (Abstract). According to Hickey, the polyol component may also include a polyether polyol, and a preferred polyether polyol is polyoxyalkylene polyether polyol. (Column 11, Lines 65-67). However, Hickey fails to require at least 20 percent by weight percent of an aromatic polyoxyalkylene polyol based on an initiator obtained from the condensation of a phenol with an aldehyde, based on total weight of the polyol composition, as required by the instant invention. Furthermore, Hickey discloses that organic carboxylic acids may be used as auxiliary chemically active blowing agents, and a most preferred carboxylic acid is formic acid. (Column 14, Lines 5-7 and 44-45). However, not only does Hickey fail to require formic acid, but it also fails to mention any thing about the required amount thereof, i.e. formic acid comprises 0.5 to 8 parts per 100 parts by weight of the polyol composition including said formic acid.

U.S. Patent No. 3,842036 ("Chow") discloses polyurethane-isocyanurates produced from an alkylene oxide condensate of a Novolak resin, an organic polyisocyanate, and a catalyst that

promotes the formation of isocyanurates from isocyanates. (Column 1, Lines 15-19). However, chow fails to mention anything about formic acid.

DISCUSSION WITH REGARD TO SECTION 112 REJECTION

Claim 18 has been amended, as suggested by the Examiner, to overcome the above-mentioned 112 Rejection. Accordingly, the above-mentioned 112 Rejection should be removed.

DISCUSSION WITH REGARD TO SECTION 103(a) REJECTION

Claims 1-5 and 8-22 are non-obvious over the U.S. Patent No. 6,359,022 under 35 U.S.C. 103(a); or in the alternative, Claims 1-5 and 8-22 are non-obvious over the U.S. Patent No. 6,359,022 in view of the U.S. Patent No. 3,842,036 under 35 U.S.C. 103(a) for the reasons stated below.

To reject claims in an application under section 103, an examiner must show a *prima facie* case of obviousness. *In re Deuel*, 51 F. 3d 1552, 1557 (Fed. Cir. 1995). All words in a claim must be considered in judging the patentability of that claim against prior art. *In re Wilson*, 424 F.2d 1382, 1385 (CCPA 1970). Furthermore, to establish a *prima facie* case of obviousness, the following three basic elements must be met: (1) the prior art reference or references when combined must teach or suggest all the claim limitations; (2) there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings; and (3) there must be a reasonable expectation of success. MPEP § 2143. Finally, if an independent claim is non-obvious under 35 U.S.C. 103, then any claim depending therefrom is non-obvious. *In re Fine*, 837 F. 2d 1071 (Fed. Cir. 1988).

First, neither Hickey nor Chow, alone or in combination, teaches all of the required elements of the instant invention.

The instant invention, as described above, requires **formic acid in the range of 0.5 to 8 parts per 100 parts by weight of the polyol composition including said formic acid**; furthermore, it requires **at least 20 percent by weight percent of an aromatic polyoxyalkylene polyol based on an initiator obtained from the condensation of a phenol with an aldehyde, based on total weight of the polyol composition**.

However, although Hickey briefly mentions formic acid as a possible auxiliary blowing agent, Hickey fails to require **formic acid in the range of 0.5 to 8 parts per 100 parts by weight of the polyol composition including said formic acid**. Furthermore, Hickey fails to require **at least 20 percent by weight percent of an aromatic polyoxyalkylene polyol based on an initiator obtained from the condensation of a phenol with an aldehyde, based on total weight of the polyol composition**. In addition, Chow fails to mention anything about formic acid.

Therefore, the teachings of Hickey or Chow, alone or in combination, fail to teach all of the required elements of the instant invention.

Second, there is no suggestion or motivation, either in the cited references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the teachings of either Hickey and/or Chow to require **formic acid in the range of 0.5 to 8 parts per 100 parts by weight of the polyol composition**.

including said formic acid, and to require at least 20 percent by weight percent of an aromatic polyoxyalkylene polyol based on an initiator obtained from the condensation of a phenol with an aldehyde, based on total weight of the polyol composition.

There is no such suggestion or motivation in either Hickey or Chow because not only do both of these references fail to require formic acid in the range of 0.5 to 8 parts per 100 parts by weight of the polyol composition including said formic acid, and to require at least 20 percent by weight percent of an aromatic polyoxyalkylene polyol based on an initiator obtained from the condensation of a phenol with an aldehyde, based on total weight of the polyol composition, but both of these cited references also teach away from the instant invention via their express teachings. Chow teaches away from the instant invention because Chow teaches that blowing agents include halogenated-substituted aliphatic hydrocarbons, water, low boiling hydrocarbons, gases and compounds easily volatized by the exotherm of the isocyanate-reactive hydrogen reaction, and thermally unstable compounds. (Column 6, Lines 37-50). Additionally, Hickey teaches away from the instant invention by requiring an aliphatic or cycloaliphatic C₄-C₇ hydrocarbon blowing agent, and further by only requiring an aromatic polyester polyol reaction product.

Therefore, there is no suggestion or motivation, either in the cited references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the teachings of either Hickey or Chow to require formic acid in the range of 0.5 to 8 parts per 100 parts by weight of the polyol composition including said formic acid, and to require at least 20 percent by weight percent of an aromatic polyoxyalkylene polyol based on an initiator

obtained from the condensation of a phenol with an aldehyde, based on total weight of the polyol composition.

Therefore, the Examiner has failed to establish all of the required elements of a *prima facie* case of obviousness.

Finally, assuming, *arguendo*, that the Examiner has shown a *prima facie* case of obviousness, the unexpected results of the instant invention negates any such obviousness.

To require **formic acid in the range of 0.5 to 8 parts per 100 parts by weight of the polyol composition including said formic acid, and to require at least 20 percent by weight percent of an aromatic polyoxyalkylene polyol based on an initiator obtained from the condensation of a phenol with an aldehyde, based on total weight of the polyol composition**, is important because this combination facilitates the production of polyisocyanate-based foams with unexpected improvements in general physical performance including flame retardancy and smoke retardation. (International Publication No. WO 2004/063423, Page 2, Lines 29-32). According to the instant Specification, foams prepared in the presence of formic acid exhibit notably stronger flame retardant and smoke suppressant characteristics than those foams prepared in the absence of the acid. (International Publication No. WO 2004/063423, Page 13, Line 19-20). The unexpected results of the instant invention is further shown in Table 1; for example, Foam 3 (an Example of the Instant Invention) and Foam 4* (a Comparative Example) show major differences in following areas, as shown in Table A:

Table A

| | Foam 3 | Foam 4* |
|--------------------------------|-------------------|------------------|
| DIN 4102 B2 rating (cm) | 6.5 | 9.2 |
| Smoke Development (NBS) | 66 | 86 |
| % Skin Cure (45-50C mold temp) | 100% at 5 minutes | 25% at 5 minutes |

Additionally, the combustion characteristics of the foams as monitored by cone calorimetry, i.e. Cone Calorimetry Peak Heat Release, indicate that the use of formic acid in the selected range, i.e. **formic acid in the range of 0.5 to 8 parts per 100 parts by weight of the polyol composition including said formic acid**, provides robust performance despite a variance in isocyanate reaction, as shown in Table 2, Foams 11-15. Such results were unexpected; thus, assuming, arguendo, that the Examiner has shown a *prima facie* case of obviousness, such unexpected results negates any such obviousness.

Accordingly, the instant invention, as described in Claim 1, is non-obvious over the U.S. Patent No. 6,359,022 under 35 U.S.C. 103(a); or in the alternative, the instant invention, as described in Claim 1, is non-obvious over the U.S. Patent No. 6,359,022 in view of the U.S. Patent No. 3,842,036 under 35 U.S.C. 103(a).

Furthermore, the instant invention, as described in independent Claims 9, 13, 14, 16, 19, 21, and 22, is also non-obvious for the reasons stated above with regard to the instant invention, as described in Claim 1.

Finally, Claims 2-5, 8, and 10-12 depend from Claim 1; thus, Claims 2-5, 8, and 10-12 are non-obvious. Claim 15 depends from

Claim 14; thus, Claim 14 is non-obvious. Claim 20 depends from Claim 19; thus Claim 20 is non-obvious.

Accordingly, the above-mentioned rejections should be removed.

CONCLUSION

In view of the forgoing, Applicant respectfully requests that the rejections be overturned and that the instant application be allowed to proceed to issuance.

Respectfully submitted,



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